UNIVERSITY
OF WOLLONGONG
AUSTRALIA

University of Wollongong
Research Online

Faculty of Science, Medicine and Health - Papers

Faculty of Science, Medicine and Health

2013

Re: Food-frequency questionnaire for assessing long-chain ω -3 fatty-acid intake

Barbara Meyer

University of Wollongong, bmeyer@uow.edu.au

Publication Details

Meyer, B. 2013, 'Re: Food-frequency questionnaire for assessing long-chain ω -3 fatty-acid intake', *Nutrition*, vol. 29, no. 5, pp. 808-809.

Research Online is the open access institutional repository for the University of Wollongong. For further information contact the UOW Library:
research-pubs@uow.edu.au

Re: Food-frequency questionnaire for assessing long-chain ω -3 fatty-acid intake

Abstract

To the Editor: I agree with Kuratko that there is a need for tailored food frequency questionnaires (FFQ), particularly for nutrients that have limited food sources, such as long chain ω -3 polyunsaturated fatty acids (LC ω -3 PUFA). Fish are the best food source of LC ω -3 PUFA, and oily fish such as sardines and Atlantic salmon contain approximately 10 times more LC ω -3 PUFA than lean fish, such as fish cakes/patties. Fish oil supplements are also a rich source of LC ω -3 PUFA, but in Australia they only contribute approximately 8% to total LC ω -3 PUFA intake [1]. Other foods, such as meat and eggs also contain LC ω -3 PUFA, as well as LC ω -3 PUFA-enriched foods such as bread, milk, and yogurt [1].

Keywords

frequency, questionnaire, assessing, long, re, chain, food, omega, 3, fatty, acid, intake

Disciplines

Medicine and Health Sciences | Social and Behavioral Sciences

Publication Details

Meyer, B. 2013, 'Re: Food-frequency questionnaire for assessing long-chain ω -3 fatty-acid intake', Nutrition, vol. 29, no. 5, pp. 808-809.

Letter to Editor Nutrition

Re: Food Frequency Questionnaire for Assessing Long Chain Omega-3 Fatty Acid Intake

Barbara Meyer, PhD

Associate Professor, School of Health Sciences and Director of the Metabolic Research Centre,
University of Wollongong, NSW Australia

President of the Nutrition Society of Australia

Phone: +61 2 4221 3459

Fax: +61 2 4221 5945

Email: bmeyer@uow.edu.au

I agree with Kuratko that there is a need for tailored food frequency questionnaires (FFQ) particularly for nutrients that have limited food sources, such as long chain omega-3 polyunsaturated fatty acids (LC n-3 PUFA). Fish is the best food source of LC n-3 PUFA and oily fish like sardines and Atlantic salmon contain approximately 10 fold higher LC n-3 PUFA than lean fish like fish cakes/patties. Fish oil supplements are also a rich source of LC n-3 PUFA, but in Australia they only contribute approximately 8% to total LC n-3 PUFA intakes [1]. Other foods like meat and egg also contain LC n-3 PUFA, as well as LC n-3 PUFA enriched foods such as bread, milk and yoghurt [1].

Whilst recognising that the 7 item FFQ is very easy to use and quick to complete, there are several limitations. Firstly, when grouping fish into low, medium and high levels of LC n-3 PUFA, there is an assumption that all fish/seafood within each category has the same amount of DHA and EPA. However, for each fish type the LC n-3 PUFA amounts will vary within each of the categories – hence this 7 item FFQ will only provide an estimate and not the exact amount as you would get by using the Meyer FFQ. For example, according to Table 1, Salmon contains approximately 7 fold higher DHA and EPA levels than fish patties, yet this should be more like a 10 fold difference when comparing the actual values.

Secondly, there are no questions on red meat intake in Table 1 and in Australia red meat and meat containing products contribute close to 50% of total LC n-3 PUFA intakes [2]. That is not because red meat is a rich source of LC n-3 PUFA; it is because Australians consume 8-10 times more meat than they do fish/seafood [1, 2]. Furthermore, in Australia beef cattle are grass fed whilst in the US they are primarily grain fed and grass fed meat contains higher amounts of LC n-3 PUFA [3]. Nevertheless, this current 7 item FFQ does not contain questions on red meat.

Thirdly, red meat contains a LC n-3 PUFA called docosapentaenoic acid (DPA), which has been shown to have cardiovascular health benefits. Epidemiological evidence indicates that all three LC n-3 PUFA (EPA + DHA + DPA) intakes are significantly and inversely related to carotid intimal-medial thickness (IMT) [4], suggesting that the cardiovascular benefits attributed to LC n-3 PUFA are not just due to EPA and DHA, but are also attributed to DPA. The Kuopio Ischaemic Heart Disease Risk Factor Study showed that men with the highest quintile of serum DHA plus DPA had a 44% reduced risk of acute coronary events compared with men in the lowest quintile, and there were no associations with EPA levels [5]. The significance was due to DHA plus DPA, not just DHA alone. In an *in vitro* study using rabbit platelet rich plasma incubated with EPA, DHA or DPA and subsequently stimulated with collagen, arachidonic acid or prostaglandin F₂ α , DPA was found to be the most potent platelet aggregation inhibitor [6]. A clinical trial has shown that partial substitution of carbohydrate with lean red meat (a rich source of DPA) resulted in lower blood pressure in people with hypertension [7]. Therefore there is evidence for cardiovascular health benefits that can be attributed to DPA, but this 7 item FFQ does not calculate DPA intakes.

Lastly, as Kuratko pointed out, the LC n-3 PUFA enriched foods such as bread, milk and yoghurt also contribute to LC n-3 PUFA intakes but this 7 item FFQ does not include questions related to the LC n-3 PUFA enriched foods.

The Meyer PUFA FFQ validation generated validity co-efficients of 0.9 and 0.7 for DHA and EPA respectively when using the methods of triads, 3 day weighed food records and erythrocyte (or plasma) levels of DHA and EPA [8]. These validity co-efficients are higher than the current 7 item FFQ which showed correlations of 0.5 when compared with 14 day weighed food records as well as when compared with erythrocyte (or plasma) levels. This shows that a more detailed PUFA FFQ which

based its LC n-3 PUFA calculations on analytical data of foods [8] is better than this 7 item FFQ. However, a limitation with the Meyer PUFA FFQ is that it is based on Australian foods. A similar version has recently been validated for New Zealand foods [9] and perhaps it is necessary to develop and validate country specific PUFA FFQs.

In summary, this 7 item FFQ will capture most LC n-3 PUFA intakes; but it lacks the contribution of red meat and LC n-3 PUFA enriched foods. This 7 item FFQ will provide results in terms of mg of DHA and EPA intakes, but this is misleading as these DHA and EPA values are not accurate given the limitations outlined above and perhaps the calculations should provide the answers as a range rather than exact mg values.

Should researchers wish to use a FFQ to determine valid actual values of LC n-3 PUFA then they should choose a tailored FFQ designed to capture the intakes of LC n-3 PUFA like the recently validated Meyer PUFA FFQ [8, 10]. If the researcher had to choose between the 7 item FFQ presented here or the validated Meyer PUFA FFQ [8, 10], the decision should depend on whether the research wants valid and actual LC n-3 PUFA intake data where the calculations are based on analytical data, or a shorter 7 item FFQ that provides a ball park figure of LC n-3 PUFA intakes.

References

1. Meyer BJ, Kolanu N. Australian children are not consuming enough long chain omega-3 polyunsaturated fatty acids for optimal health. *Nutrition* 2011;27:1136-1140
2. Howe PRC, Meyer BJ, Record S, Baghurst K. Dietary intake of long chain omega-3 polyunsaturated fatty acids: contribution of meat sources. *Nutr.* 2006 Jan; 22(1): 47–53.
3. Ponnampalam EN, Mann NJ, Sinclair AJ. Effect of feeding systems of omega-3 fatty acids, conjugated linoleic acid and trans fatty acids in Australian beef cuts: potential impact on human health. *Asia Pac J Clin Nutr* 2006; 15(1):21–29.
4. Hino A, Adachi H, Toyomasu K, Yoshida N, Enomoto M, Hiratsuka A, Hirai Y, Satoh A, Imaizumi T. Very long chain N-3 fatty acids intake and carotid atherosclerosis. An epidemiological study evaluated by ultrasonography. *Atherosclerosis* 2004; 176: 145–149.
5. Rissanen T, Voutilainen S, Nyyssönen K, Lakka TA, Salonen JT. Fish-oil derived fatty acids, docosahexaenoic acid and docosapentaenoic acid and the risk of acute coronary events: The Kuopio Ischaemic Heart Disease Risk Factor Study. *Circulation* 2000; 102: 2677–2679.
6. Akiba S, Muata T, Kitatani K, Sato T. Involvement of lipoxygenase pathway in docosapentaenoic acid-induced inhibition of platelet aggregation. *Biol. Pharm. Bull.* 2000; 23(11): 1293–1297.
7. Hodgson JM, Burke V, Beilin LJ, Puddey IB. Partial substitution of carbohydrate intake with protein from lean red meat lowers blood pressure in hypertensive people. *Am. J Clin. Nutr.* 2006; 83: 780–787.
8. Swierk M, Williams PG, Wilcox J, Russell K, Meyer BJ. Validation of an Australian Electronic Food Frequency Questionnaire to Measure Polyunsaturated Fatty Acid Intake. *Nutrition* 2011;27:641-646
9. Ingram MA, Stonehouse W, Russell KG, Meyer BJ, Kruger R. Validation of a semi-quantitative food frequency questionnaire to assess PUFA intakes in the New Zealand population. *Journal of Nutrition* 2012 (accepted).
10. Meyer BJ, Swierk M, Russell KG. A tailored PUFA food frequency questionnaire assesses long chain omega-3 PUFA better than a generic dietary questionnaire. *Nutrition* 2012 Aug 25. [Epub ahead of print]